GENESIS

IMAGING AND MAPS/LINE

USER'S MANUAL

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EDAX INC.
91 McKEE DRIVE
MAHWAH, NJ 07430
USA

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GENESIS IMAGING – USER'S MANUAL

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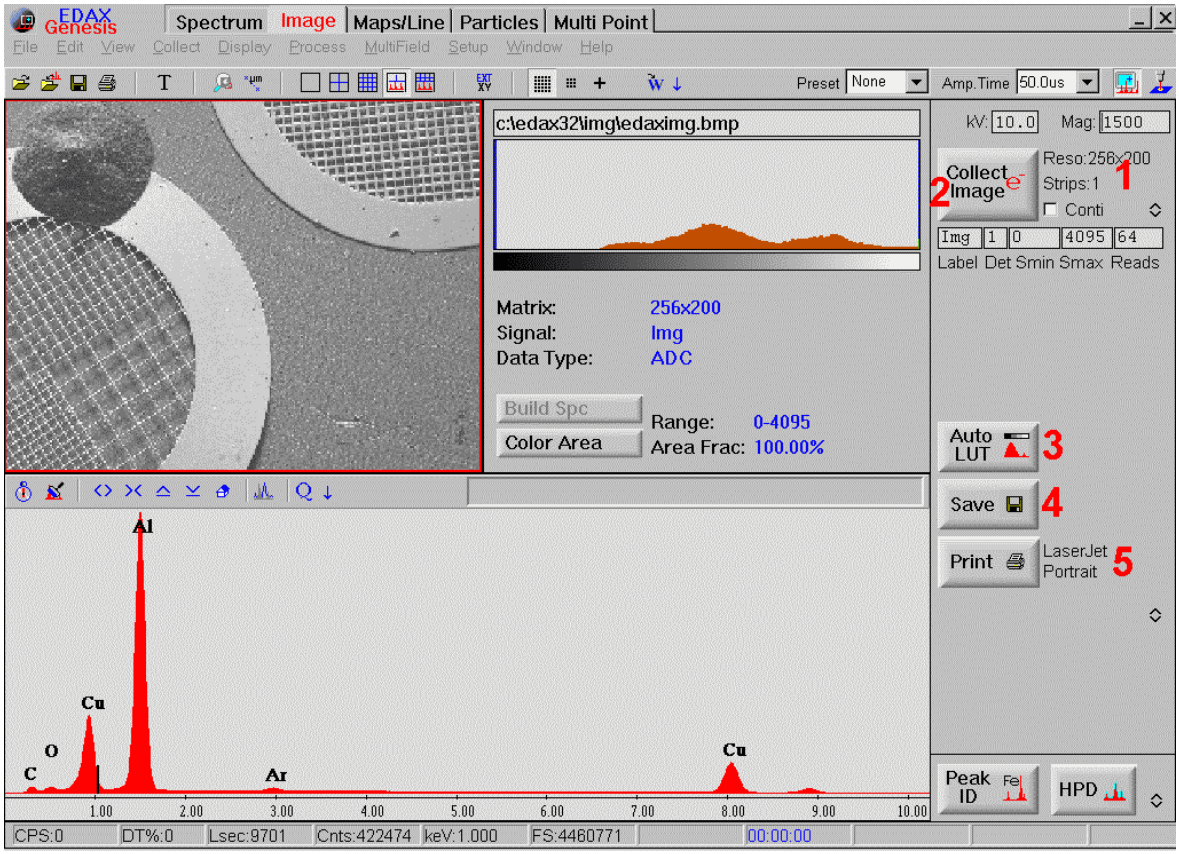
1 QUICK START

Quick Start to Genesis Imaging

1. Right mouse click on the text to the right of the collection button. Select a matrix size and the desired number of reads.
2. Click on the “Collect Image” button.
3. Use the auto look up table button (LUT) to adjust the contrast and brightness if desired.
4. Click on the save button and select a file name and either .bmp or .tif.
5. Print the Image file.



2. IMAGING TAB LAYOUT

The layout of the imaging panel follows the Genesis design with a main panel on the right hand side of the screen with expandable portions to display buttons for advanced analysis. The tool bar contains buttons for the main analytical tools and the central portion of the screen is the analysis window.

2.1 The Pull Down Menu

The Pull Down Menus across the top of the Imaging screen allow for feature utilization and image collection and enhancement.

2.2 The Tool Bar

The button bar that is below the pull down menu offers quick keys for many of the frequently used features and functions in the imaging tab. The buttons are as follows.

Open a file

Import a spectrum from other Genesis tabs

Save a File

Print

Annotate Image/ Map

Zoom, Measure on Map or Image

Screen View (single image, four images, 16/36 images, image and spectrum, 8/18 images and spectrum)

Multi field Stub View

Enable external scan

Raster mode (Full frame, reduced area, spot, hand drawn)

Send data to Microsoft Word Template

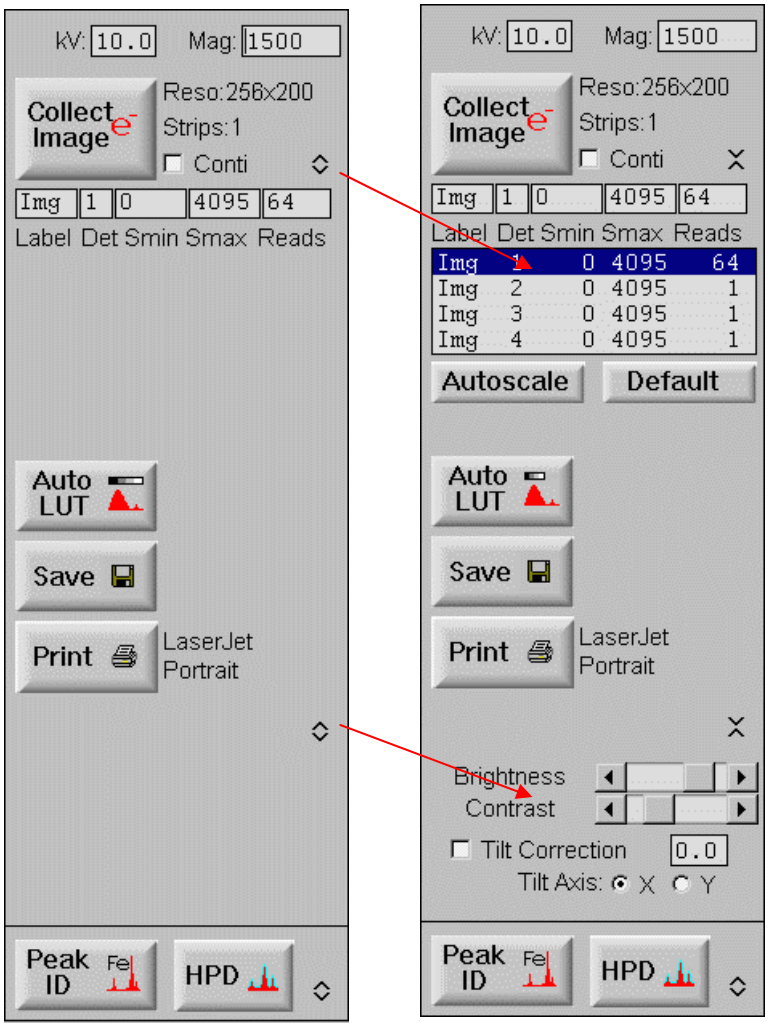
Select EDS Detector

Set preset acquisition time, Select the time constant

Panel view buttons: Main Imaging Panel and Microscope control.

2.3 The Control Panels

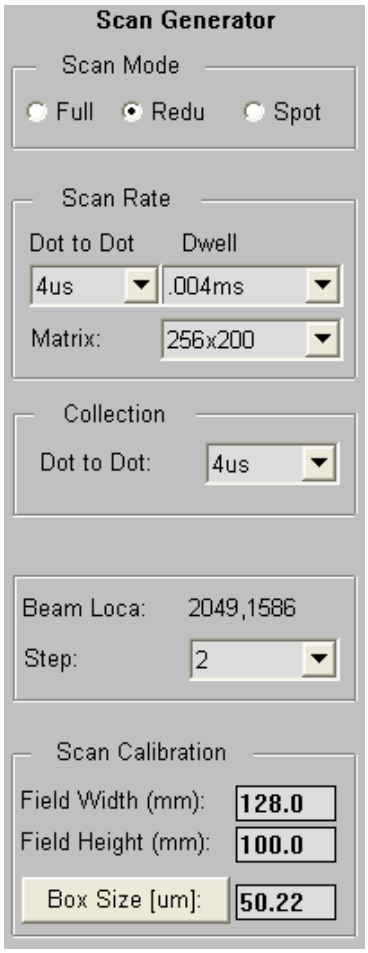
The imaging Tab, like the spectrum tab, has a control panel on the right hand side of the screen. From the panel, working from top to bottom, the set up parameters and collection buttons can easily be accessed.

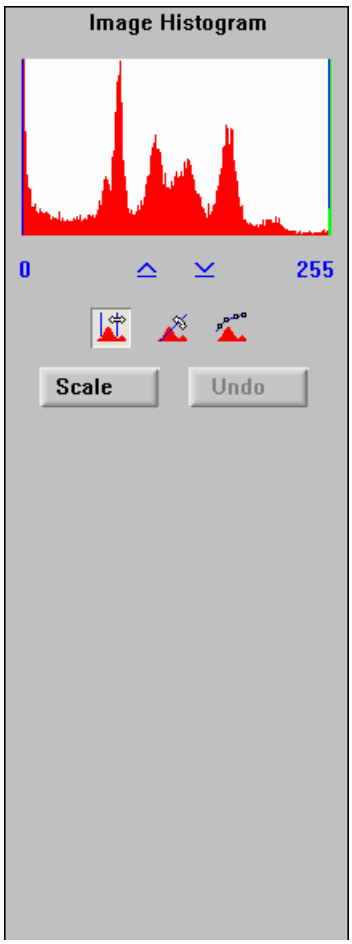


2.4 Other Panel Views

Additional panel views can be accessed through the pull down menus. The microscope control panel and the main Image panel can be switched between by clicking on the panel selection buttons on the far right hand side of the button bar. The image histogram panel can be accessed by selecting “Rescale” in the “process” pull down menu (Section 5.6). The Scan generator panel can be accessed through the “Set Up” pull down menu

(Section 5.7). To switch back to the main imaging panel, click on the image panel button in the button bar.



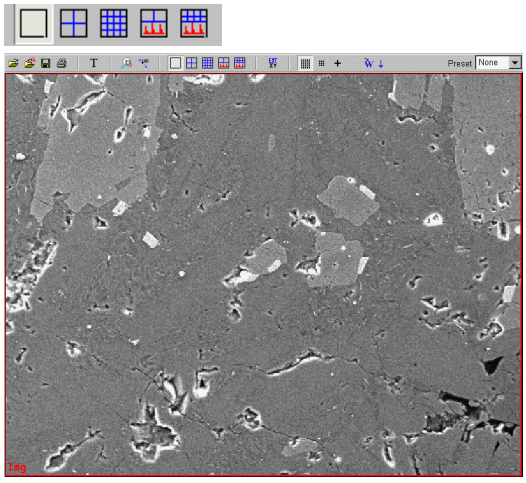


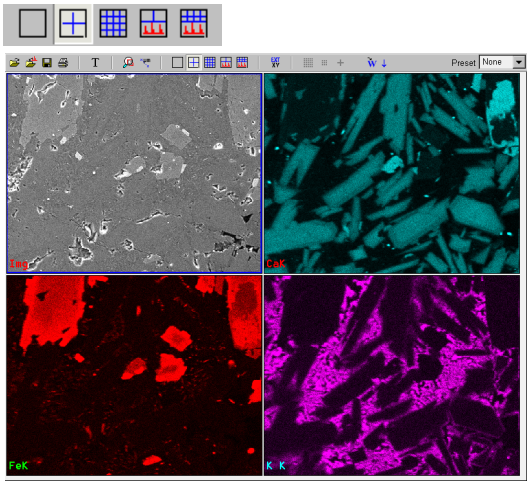
2.5 The Status Bar

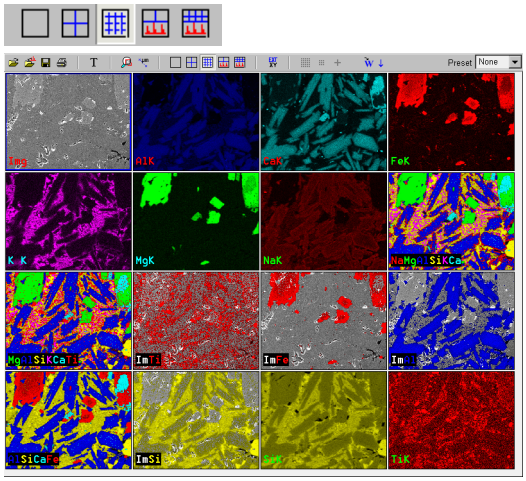
The bottom status bar provides useful information such as (from left to right) the current counts per second, dead time percentage, collection time, counts in channel under the cursor in the spectrum, keV location of the cursor, full scale value of the spectrum, memory required for map collection and the estimated time of map collection.

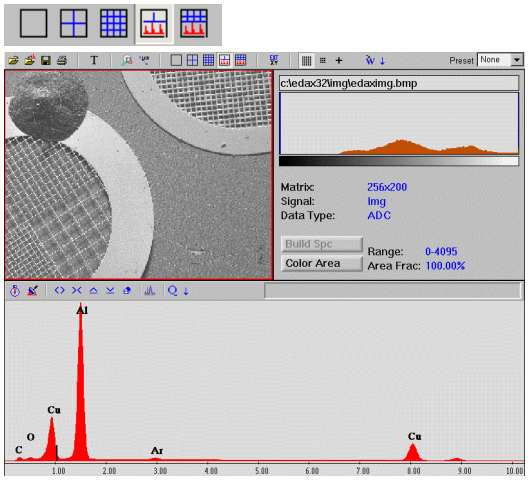
2.6 Image Views

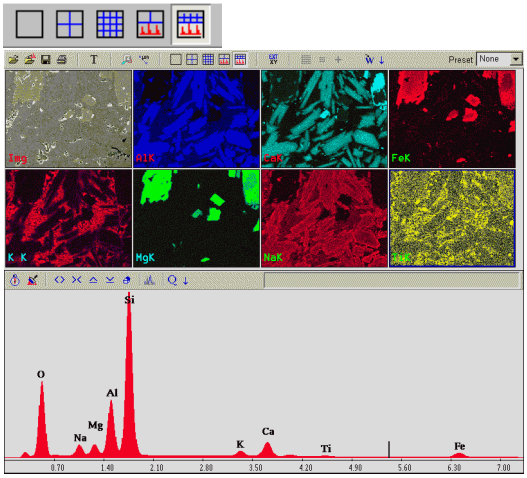
The main image-viewing portion of the screen can be viewed with 1 image on the screen, 4 images, 16 images, 1 image with an image histogram and a spectrum or 4 images and the spectrum. Use the screen view buttons to toggle between view modes.








c:\edax32\img\edaximg.bmp
Matrix: 256x200
Signal: Img
Data Type: ADC
Build Spc
Color Area
Range: 0-4095
Area Frac: 100.00%
Al
Cu
O
C
Ar
Cu


Si
O
Al
Mg
Na
K
Ca
Ti
Fe

3. SET UP PARAMETERS FOR CAPTURING AN ELECTRON IMAGE

A wide range of set up conditions are available for the collection of the SEM image in the Genesis Image Tab.

3.1 Microscope Setup

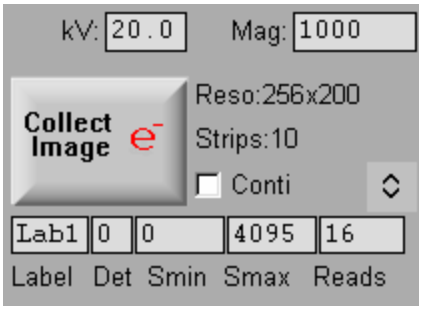
The Microscope should be set and focused to the desired image. Any focusing or stigmation problems should be fixed and the contrast and brightness optimized before the digital image is collected. If the EDAX system includes column control, the magnification and the kV will automatically be read into the imaging panel. If the system does not have column control, enter the correct values into the edit boxes at the top of the image panel.

3.2 External Control

In the EDAX software, the external x and y button enables the EDAX software to take control of the beam, acquire an electron image, or scan particular location in spot or reduced area mode. In many cases external control will be enabled automatically when an image is collected. To switch to external x and y manually, or to turn the external control off, click on the "EXT X and Y" button in the button bar. The microscope screen will freeze the image or blank the screen while in external control.

3.3 Image Parameters

The first set up parameter to select is a matrix size for the image. Resolutions for the image refer to the size of the digital image. The lower the resolution the faster the collection and smaller the file but the more pixilated the image will be. Select the image size depending on the resolution needed, time requirements and any file size restrictions. Right mouse click to the right of the image collect button at the top of the imaging panel. Select the resolution desired. The text next to the collection button will update with the selected resolution.



3.3.1 Strips

Strips refer to the updating of the image on the screen as the image is collected. With one strip the entire image will be collected and displayed at

once on the screen. If ten strips are used the image will be displayed in ten sections as the image is collected. Select the number of strips desired. The number of strips will only change the way that the image is displayed while collecting, not the final image. The number of strips can be selected by right mouse- clicking on the text to the right of the image collect button and selecting the desired number from the displayed list.

3.3.2 Reads

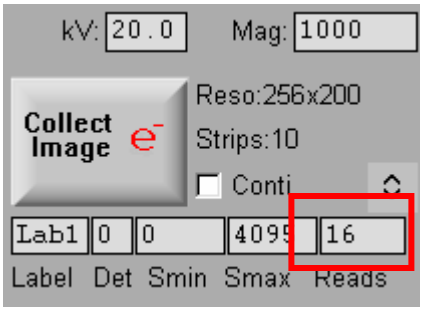
Reads (also called Integration Factors) can be added to help minimize any noise in the image. For each integration factor that is added, the beam will collect again at every pixel and average the results of each collection. For example, if 16 integrations are added, data will be collected at each pixel 16 times and averaged together.

3.3.3 Tilt Correction

If the Image is collected while the sample is titled, a tilt correction can be applied to the image. To use the correction, expand the lower portion of the main imaging panel. Add the tilt in the edit box and hit enter. When a fresh image is collected the tilt correction will be applied.

3.3.4 Image Label

A label can be given to the image by typing a four-letter designation into the label box. This label can be displayed and printed in the lower left hand corner of the image. To display the label, select “label” from the “Display” pull down menu. To hide the label, deselect label in the pull down menu. This label is saved with the image.



3.3.5 Image Levels

Digital Image collection can be customized so that only particular levels of greyscale are collected. Select the greyscale minimum and enter it into the Smin edit box and then hit enter. Select the maximum greyscale level to be collected and enter it into the Smax edit box. In most cases all greyscale levels (0 to 4095) will be collected. It may be useful to modify these levels when the contrast on the microscope is maximized but the image is still lacking in contrast.

3.4 Image Setup

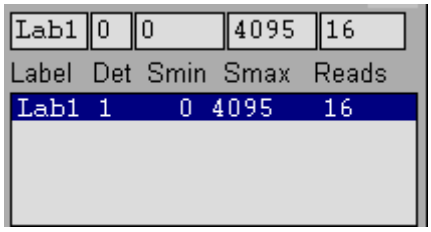
In the expanded image collection panel up to four detectors and image collection setups can be created and switched between for collection.

3.4.1 Enter Parameters

With the first line highlighted (by clicking on) in the box below the Label edit box, type a label, detector number, Smin and Smax Value and reads for an image collection. Additional image selections may be highlighted and modified. The image will be collected with the parameters of the highlighted choice.

3.4.2 Multiple Setups

The set ups can be modified by only one or two selections such as the label or reads. In most cases, there is only one detector (1), and the full range of greyscale values are to be collected, so these settings can remain constant and the label and reads can be set to four of the most commonly used choices. The selected choice will appear when the panel is compressed.



4. COLLECTING, SAVING AND DISPLAYING AN ELECTRON IMAGE

Electron Images can be captured, displayed and saved as bitmaps or tiffs within the Image tab window.

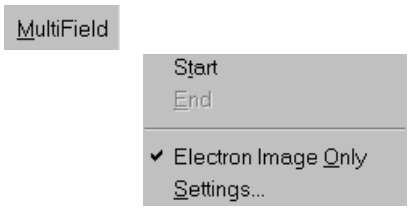
4.1 Image Collection

To collect a digital electron image from the microscope click on the image collect button on the top of the image panel.

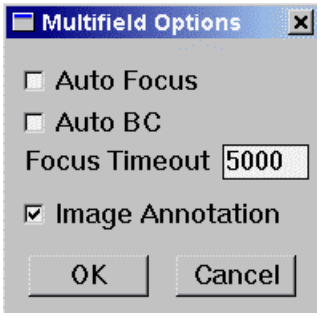
4.2 Multi Field Image Collection

To collect electron images from multiple fields automatically:

- Select the stage locations as described in section 6. of the Genesis/Maps User's Manual.
- From 'Multifield' menu select 'Electron Image Only' option.



- 'Settings...' allows to select following options, applied to each field:



- Select 'Start' from the Multifield menu to start the process.

The file name you select for the output data will be incremented for each field. If 'Image Annotation' is selected in the 'Multifield Options' above, the incremented file name will be pasted into each image.

4.3 Image Display

Once the image has been collected it can be displayed as a single image in the window, multiple images can be displayed at one time or one image with a spectrum below and histogram to the right can be viewed in the imaging window. Use the screen view buttons to select the desired screen arrangement.

Screen views: 1 Image, 4 images, 16 images, Image with histogram and spectrum, 8 images and spectrum.

4.3.1 Selected Image

When an image is collected, it will display in the highlighted window in the 4 or 16 view, or it can be collected into single view or spectrum view.

4.3.2 Clearing Images

To remove an image from the screen, highlight the image and choose “Clear Selected” from the Edit pull down menu. To remove all of the images from the 4 or 16 view, select “Clear All” from the file pull down menu. A new image can also be collected over an existing image by highlighting that window and collecting the new image into that window.

4.4 Saving Images

Images can be saved as either a bitmap (.bmp) or a tiff (.tif) file. To save the image, click on the “Save” button on the bottom of the main imaging panel or select “Save As” from the “file” pull down menu. Browse for the desired location, select a name and file type and then hit enter.

4.5 File Types Saved

When the image is saved three files will actually be saved. The image file is saved as well as an image parameters file. The image parameter file (IPR) saves the image collection conditions. A text file is saved with the image label and comments.

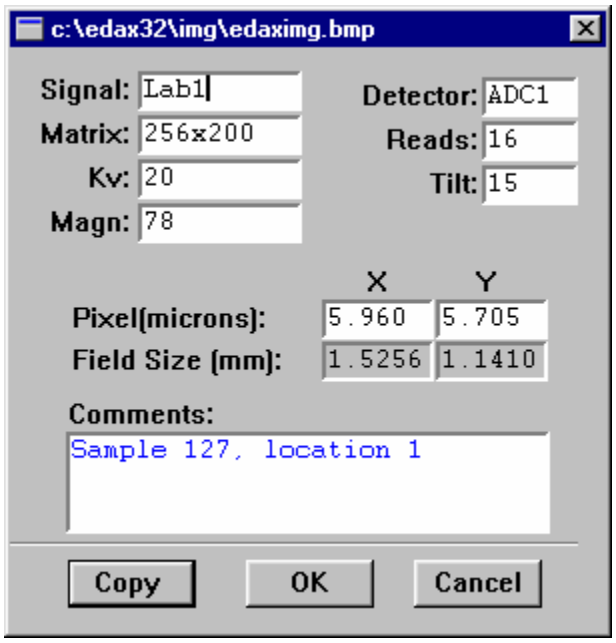
4.5.1 The IPR File

The ipr file is saved with the same name and in the same location as the image file with the file extension .ipr. When the file is opened again the data from the IPR file is automatically read into the imaging program. In the image parameters file the conditions at the time of collection are stored so that the parameters can be reviewed at a later time. These parameters are read automatically at the time of collection if the system had column control. If the system does not have column control the kV, tilt and magnification

should be entered into the edit boxes at the top of the image collection panel or in the microscope control panel. The size of each pixel as well the size of the field of view is saved as well.

4.5.2 Viewing the IPR Information

To view the IPR file, select “Img parameters file” in the “Edit” pull down menu. The Image parameters window will be displayed with all of the current parameters listed in the edit boxes.



4.5.3 Editing the Image Parameters

If the information in the ipr is incorrect it can be changed by highlighting the incorrect information and then typing the correct value in the edit box. **Hit enter after every change.** When all of the changes have been made, close the window by clicking on “ok” and then resave the image by clicking on the “save” button on the imaging panel or by selecting “save as” in the “file” pull down menu.

4.5.4 Image Comments

The comments section in the ipr window is for any information that the user may want to save with the image. The comments will be printed to the right

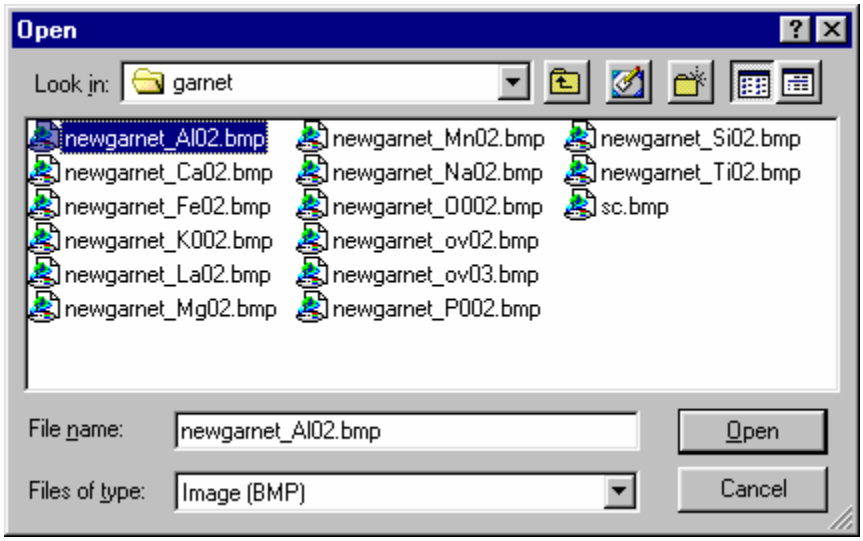
of the image when printed with a spectrum or on the top of the page when printed as a single image.

4.6 Recalling Stored Images

Images and their corresponding ipr file can be recalled into the imaging program. Images can also be opened into most graphic programs as well. The information in the ipr file will not be read into these programs however.

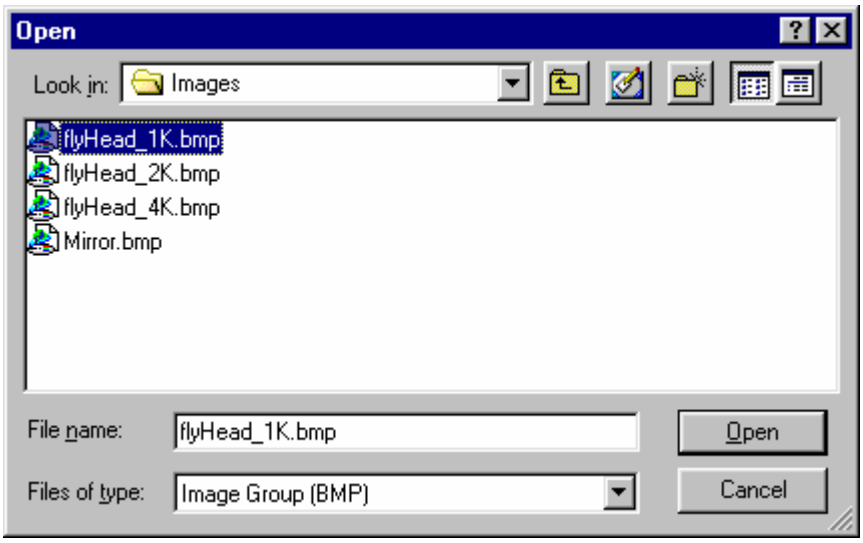
4.6.1 Opening an Image file

To recall an image select “Open” from the file pull down menu or use the “open” button in the button bar. From the window, browse for the desired file, select Image.bmp or Image.tif as the file type, highlight the file in the list and then click on “Open”.



4.6.2 Opening an Image Group

The file type “Image Group” can be used if more then one file that has the same root name are to be opened at once. For example, if ten images were collected from the same sample and they were saved with the same root name and a different extension (sample1_Loc1, sample1_Loc2, sample1_Loc3, for example), one name in the list can be highlighted, select “Image Group” as the file type and then the “open” command will open them all into the 16 view mode.



4.6.3 Clearing Images

To clear an image from the screen, highlight the image (click on it) and select “Clear Selected” from the Edit pull down menu.

4.7 Printing Images

Images can be printed by clicking on either of the printer icons. The layout of the print out will be based on the screen view selected at the time of printing and the conditions selected in the page set up dialogue box.

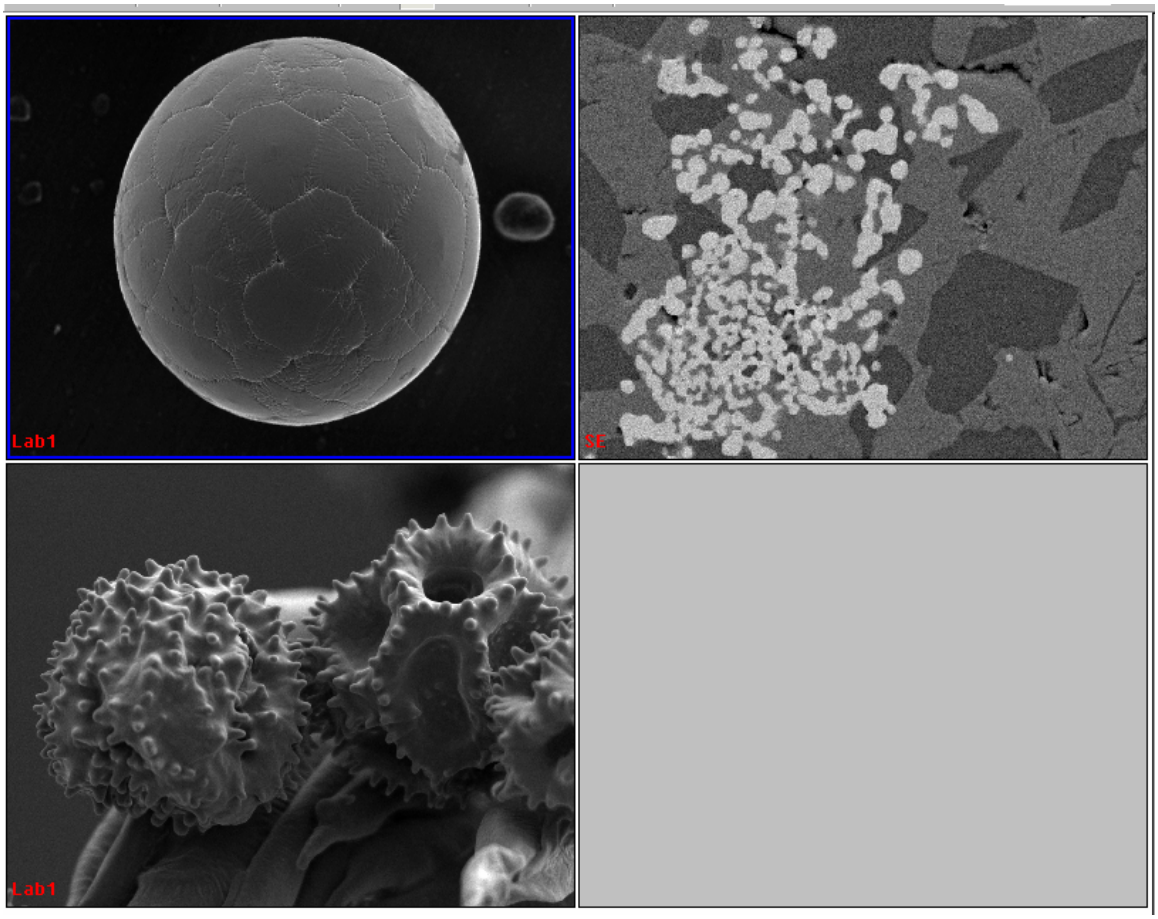
4.7.1 Printing in Single View

Printing an image in the single view mode will print the image scaled to one page. Click on the print button in the panel or in the button bar to print with the last printing settings. To change the printer settings (which printer, paper orientation, paper type, etc.) select Print from the file pull down menu and the printer dialogue box will appear and the settings can be changed. This dialogue box is specific to the printer being used.

4.7.2 Printing in Multiple Image View

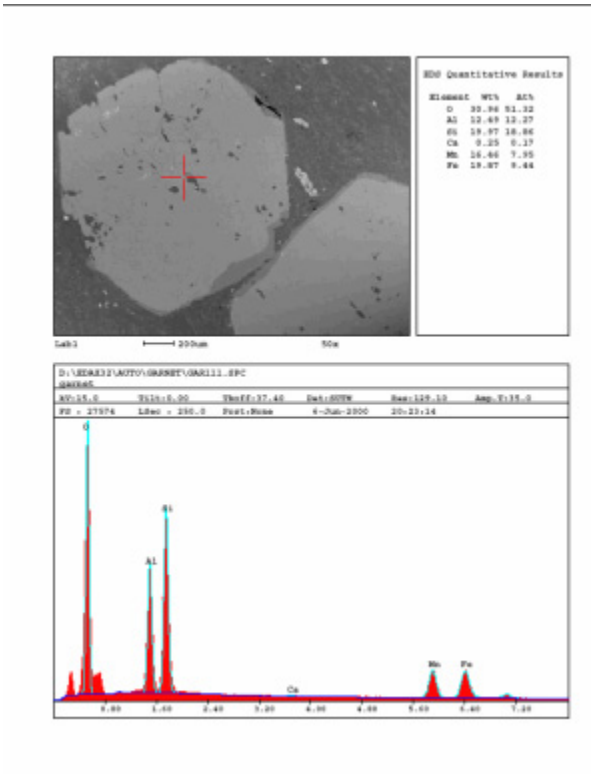
In four view, between 1 and 4 images can be printed and will be scaled to fit four images per page. All of the images to be printed must be selected

(outlined in blue) by clicking on the image. To select multiple images click on the first image and then hold the shift key and click on the last image. All of the images in between will be highlighted. Multiple images can also be highlighted by holding down the control key and then clicking on each image to be printed. The display below shows three images with only the first image highlighted. In sixteen view, from 1 to 16 images can be displayed and printed. Highlight all of the maps to be printed as is done in four view.



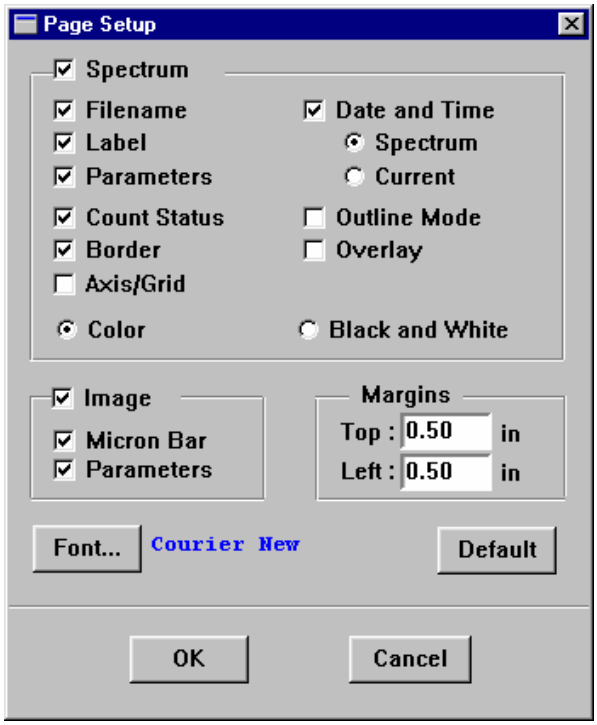
4.7.3 Printing in Spectrum View

The image can also be printed with a corresponding spectrum. In spectrum view, arrange the spectrum as it is to be printed and with the desired image displayed, click on the print button. The image will appear in the upper portion of the screen with the spectrum below. To the right of the image the image parameters and anything written in the comments section will appear. If the spectrum is quantified, the quant results will appear in place of the histogram.



4.7.4 Page Setup

In the “file” pull down menu, the selection for Page set up allows the user to determine what information is printed. Selections in the page set up box can be checked for all of the characteristics that are to be printed.



4.7.5 Print Setup

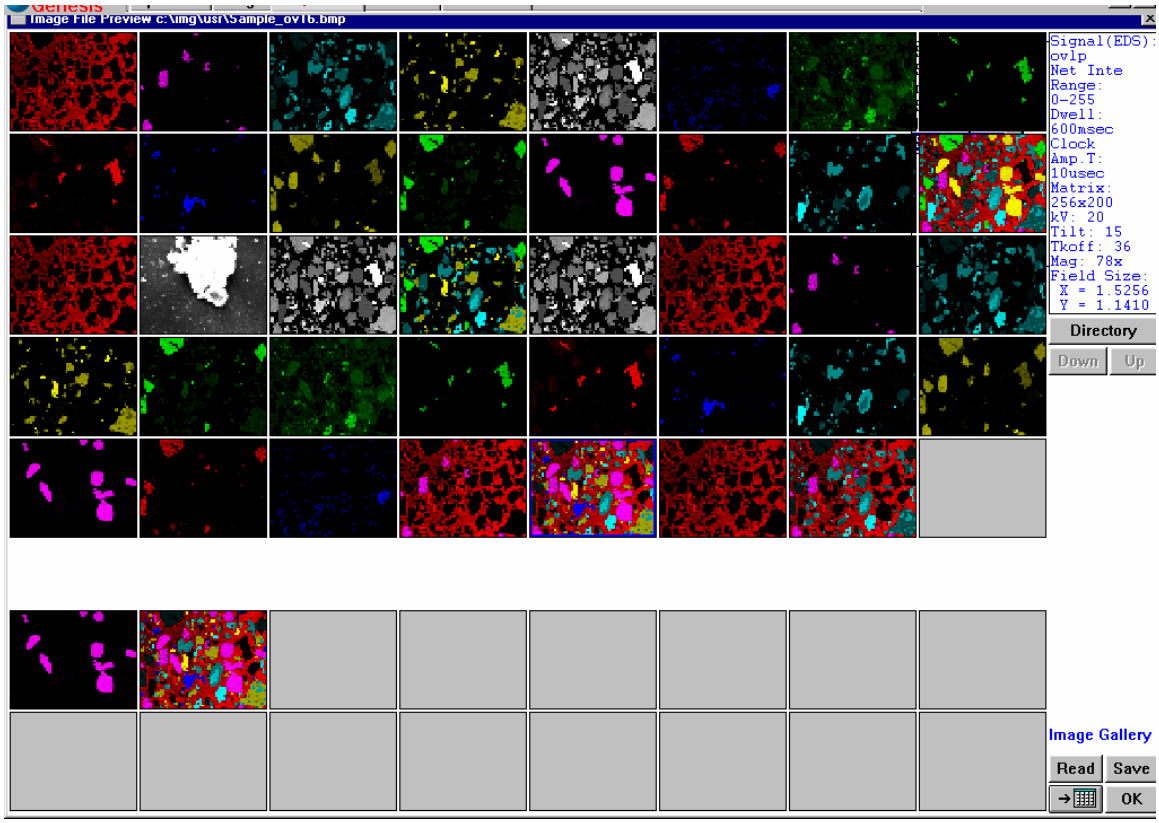
The print set up dialogue box is different for each printer and will allow for different printer settings such as paper selection, paper orientation and printing speed. To view the print set up dialogue box click on “Print Set Up” in the file pull down menu.

4.8 Image Preview

File preview mode allows for the viewing of thumbnails and comments/ conditions for all of the maps and images in a particular folder. A gallery file, an assotiation of files of interest, can also be created and saved.

4.8.1 Opening the Preview Window

To open the preview mode, select “Preview” from the “File” pull down menu. Select the folder in which the images to preview are located and hit “Open”. All of the images and any maps in that folder will be displayed in the preview window. If there are more then 40 images the up and down buttons will be enabled to view the remaining maps.



4.8.2 Viewing the File Parameters

The image parameters for the image that is highlighted (surrounded by blue box) will be displayed in the text box on the top right hand side of the preview window. To view the parameters for a different image click on the image and the information in the parameters window will update.

4.8.3 Gallery Files

A gallery file, a collection of up to 16 images and maps of interest, can be created containing any of the maps in the preview window. Select one of the images of interest. Right mouse click on the image and drag it into the lower 16 windows. Repeat this for any other images of interest. When all of the images have been brought into the lower windows click on the "Save" button at the bottom of the screen. From the "Save As" window select a name and location for the file. The file type will default to gallery (.glr) file. The gallery file can be read back into the preview window at a later time by clicking on the "Read" button at the bottom of the preview window.

4.8.4 Gallery Files from Multiple Folders

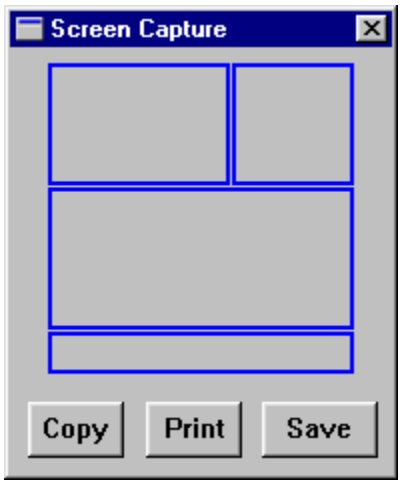
Gallery files can be created from images and maps in different folders as well. Open the preview window as described above and select the files from the first folder to be added to the gallery. Click on the directory button in the preview window button. Browse for the folder that contains the next images to be added to the gallery. Open the new folder and add the images to the gallery. Repeat until all the desired images have been added.

4.8.5 Importing Images into 16 View

The selected images in the lower window can be brought into the 16-view mode to be viewed, printed and/ or processed. To do this, click on the 16-view button at the bottom of the preview screen. All of the images in the lower windows will be brought into the 16-view in the maps/ line tab. A gallery file can also be opened and then brought into 16-view in the same way.

4.9 Screen Capture

Screen Capture allows for a portion of the screen to be copied and saved as an image file. The screen capture window can be accessed by selecting "Screen Capture" from the "Edit" pull down menu. The screen will be displayed divided into four sections, similar to the image, histogram and spectrum view although it can be used with other screen views as well. The very bottom portion of screen represents the status bar.



4.9.1 Selecting the Screen Areas and Saving

Highlight the portion, or portions, of the screen that are of interest. To capture that portion of the screen and save it as a bitmap, click on the save button. A window will appear in which a name and file location can be selected. The file type will be bmp.

4.9.2 Copying the Screencapture to the Clipboard

The highlighted portions of the screen can also be copied (as a single graphic) to the clipboard and pasted into a graphics program or a Microsoft Word document. With the areas of interest highlighted, click on the copy button. The graphic will now be available on the clipboard in the other program

4.9.3 Printing the Screen Capture

The highlighted portions of the screen can also be copied (as a single graphic) to the clipboard and pasted into a graphics program or a Microsoft Word document. With the areas of interest highlighted, click on the copy button. The graphic will now be available on the clipboard in the other program.

5. IMAGE PROCESSING

Once an image has been collected various techniques can be used to enhance the image or to add information to the image.

5.1 Image Clipboard Functions

Images can be cut or copied from any screen view and pasted into an open window or into another program such as Microsoft Word.

5.1.1 Cut and Copy

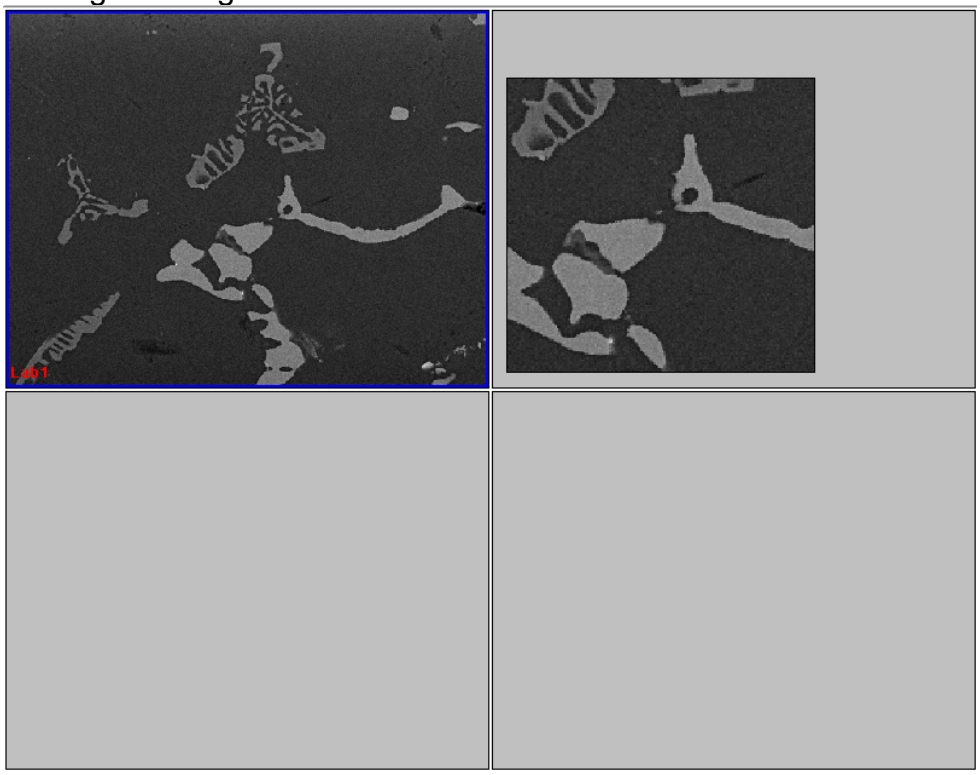
Highlight the desired image. From the “Edit” pull down menu, select “Cut” to remove the image from the screen and place it on the clipboard, or select “Copy” so the image will remain on the screen and a copy will be placed on the clipboard.

5.1.2 Paste

Highlight another window and select “Paste” from the edit pull down menu. The image can also be pasted into a word document or another program.

5.2 Zooming the Image

Zooming the Image can be implemented in the four and sixteen view screen modes. Click on the zoom button in the tool bar and draw a box on the image over the area that is to be zoomed. The zoom will then appear near the original image.



5.2.1 Moving the Zoom

Click and hold on the zoom and then drag the mouse to move it else where on the screen.

5.2.2 Removing the Zoom

To remove the zoom, double click on it.

5.2.3 Zoom to Clipboard

The zoomed image can be placed on the clipboard by selecting “zoom to clipboard” in the “Edit” pull down menu. The zoom can now be pasted into a report or into one of the other windows in 4 and 16 view modes. To do this, send the zoom to the clipboard, select (click on) the window into which it is to be placed and then click on “Paste” in the edit pull down menu.

5.2.4 Saving the Zoom

The zoom can now be saved as a collected image would be by highlighting the window with the zoom, selecting “save as” in the file pull down menu and selecting a name and location. The file type can be either .bmp or .tif.

5.2.5 Saving the Zoom Data

Another option for saving the zoom is to select “save zoom data” in the file pull down menu. This will save all of the intensity data in a .csv file format.

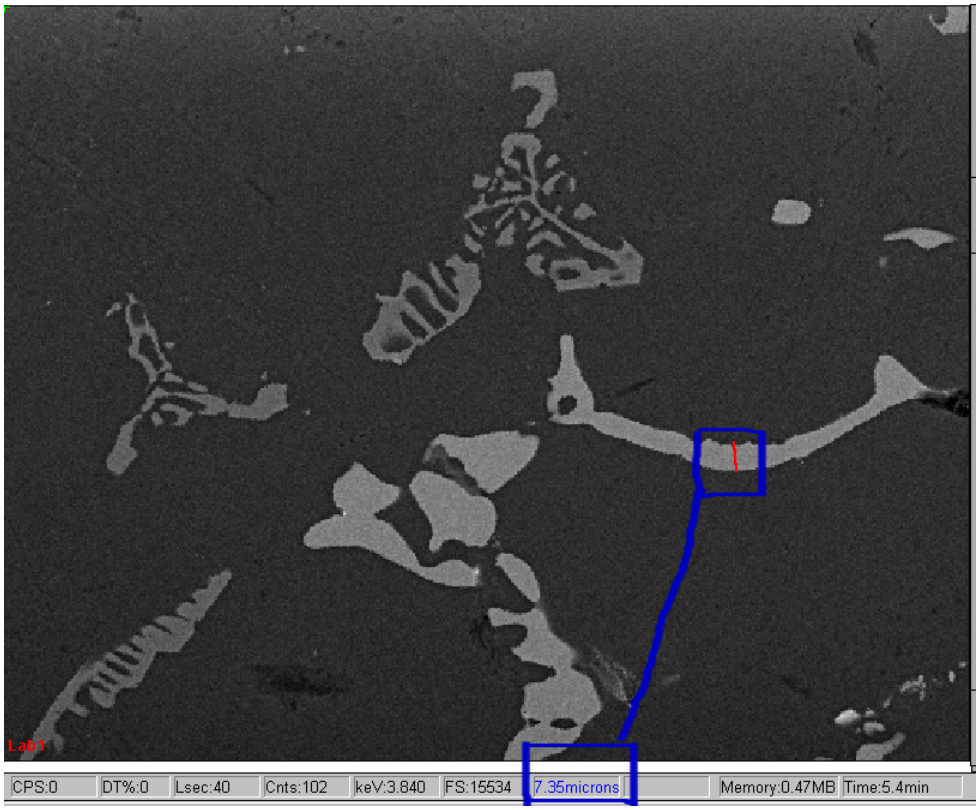
5.3 Measurements

The Measurement feature enables the user to measure features on an image. A measuring line can be drawn using the mouse in the desired length and location.

5.3.1 Drawing the Line

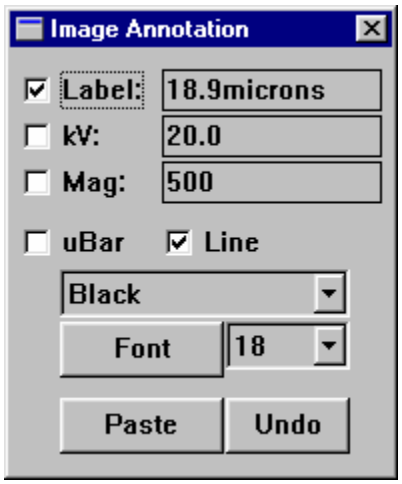
To draw a line for measurement switch to either the single or four view mode.

- Click on the measurement button in the tool bar.
- Using the mouse (left button) draw the line on the image.
- The measurement value will appear in the status bar at the bottom of the screen.
- To draw another measurement, click the measurement button again and then follow the same procedures.



5.3.2 Burning the Measurement on the Image

To burn the line and the measurement into the image, open the annotation widow ("Edit" pull down menu) Draw the measurement line on the image. The length of the line, in microns, will appear in the label box and a check box for the line will also be available. Click on the paste button to add these to the image. (See more on annotation in section 4.4) *Note: If the measurement appears to be out of calibration, see section 5.10.4.*



5.4 Image Annotation

The image can be annotated with text, location markers, measurements and collection conditions. To annotate the image, click on the “T” button in the tool bar or select “Annotate” from the edit pull down menu. The annotation window will open and display the options for annotation.

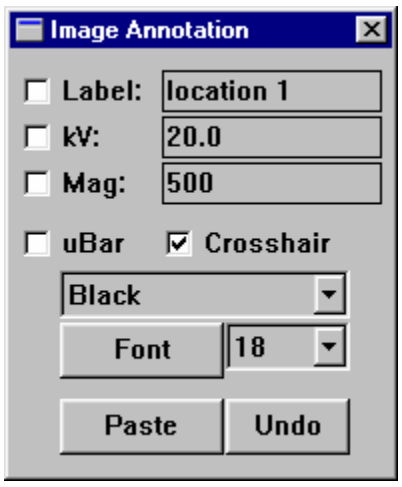
5.4.1 Basic Annotation

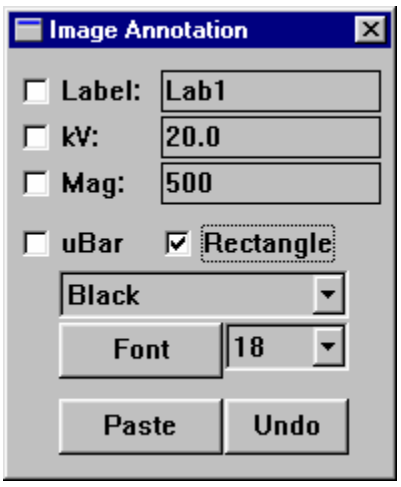
The basic annotation window allows for the addition of collection parameters and a label. In the window, check the information that is to be added on the image. By default, the information will appear in the lower left hand corner of the image. To place the information in another location, switch to the crosshair (spot collection), place the cross hair on the image at the location where the text is to begin. Once the text and the location has been selected, select a font size and color. Click on paste to add the text.

****Tip: the font size is related to the matrix size of the image. For larger images a larger font size should be used than for a lower resolution image.*

5.4.2 Spot or Selected Area

To paste a crosshair or a selected area rectangle onto the image, place the beam control into the desired mode, position the crosshair or draw the box and the annotate box will update to have a selection for the appropriate mode. By default, the box will be checked for the collection mode. Click on paste to apply to the image.

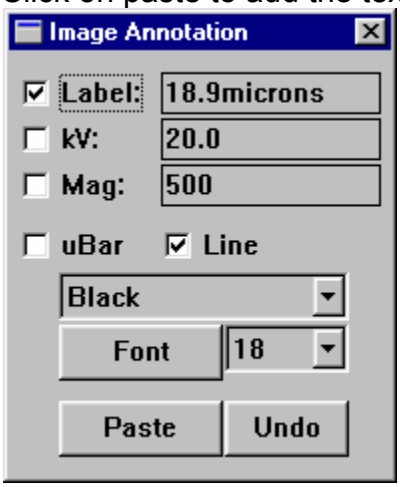




5.4.3 Measurements

Measurements (section 4.2) can be pasted on to the image next to the measurement line. To do this, open the annotation widow (“Edit” pull down menu) and then follow the steps for measuring on an image. The length of

the line, in microns, will appear in the label box and a check box for the line will also be available. Click on the paste button to add the line to the image. Position the cross hair (used for spot mode) where the measurement is to be pasted. Switch from the choice for line to the label. Where the measurement appears. Click on paste to add the text.



5.4.4 Undo

To remove the annotation an image, click on the undo button. This allows for one level of undo.

5.4.5 Saving the Annotation

To save the image with the annotation, highlight the image and then click either save, to save over the original image file, or select “save as” in the file pull down menu to save the annotated image with another name. Annotation is not automatically saved and will be lost of the image is closed without first saving.

5.5 Area Fraction

The Area Fraction of a given phase can be determined using the image histogram. In the spectrum view move the blue cursors on the so that they span the portion of the histogram that represents the phase of interest. Click on the “Color Area” button to highlight the phase on the image. Below the histogram the range (greyscale levels) and the area fraction of that phase will be displayed.

***Tip: to save the image with the overlay, select “Edit” “Screen Capture” and proceed with a screen capture as explained in section 4.8.

5.6 Auto LUT

The Auto LUT (Look Up Table) button is displayed in the main imaging panel. This button allows for two basic greyscale adjustments.

5.6.1 First Adjustment

The first time the button is clicked, the look up table is modified so that the darkest pixel in the image becomes black and the lightest pixel in the image is white (scaled to the images minimum and maximum levels.

5.6.2 Second Adjustment

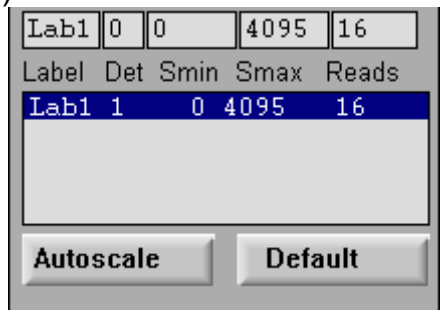
The second time that the button is clicked the look up table is further modified so that the brightest and darkest 1% are excluded and the histogram is than stretched.

5.6.3 Original Histogram

The third time the button is clicked the image will return to the original look up table (0-255).

5.7 Autoscale and Default

The AutoScale and Default buttons that are located in expanded imaging panel can be used to make adjustments to the lookup table. Autoscale - Scan the frame for finding the signal and create a video lookup table based on the Smin, Smax values. The Default button resets the Smin, Smax to the default values (0,4095).



5.8 Image Processing

Image Processing tools for adjusting the digital image can be accessed through the “Process” pull down menu. For processing, switch to the 16 view mode.

5.8.1 Frame Operations

The Add, Subtract, Multiply and Divide operations will take the first two selected images as input operands. The operation will be performed at each corresponding pixel and the result placed in a new image displayed in the first empty window available.

5.8.2 Spatial Filtering

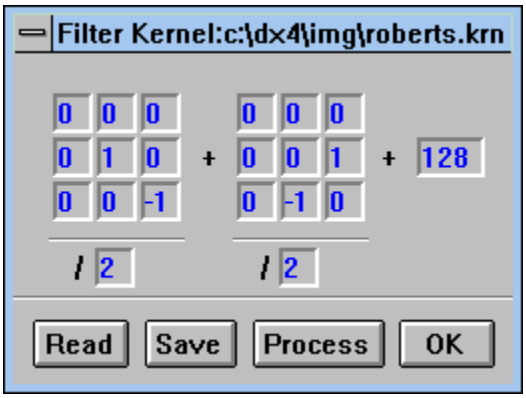
Spatial Filtering. Median and Kernel filtering operations take one image operation and place the result in the first empty window available. The filtering is done using a matrix of 3x3 pixels.

5.8.3 Median Filter

Median Filter- The pixel value in the resultant image is obtained by sorting the values of the surrounding pixels at each corresponding pixel in the input image and selecting the median value.

5.8.4 Selected Kernel

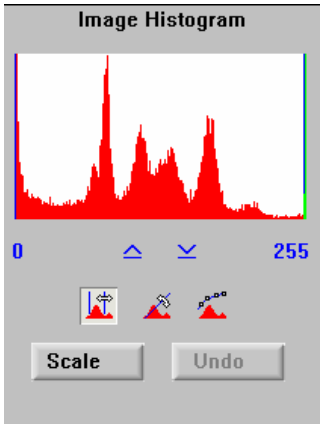
Selected Kernel- The pixel value in the resultant image is obtained by processing the corresponding pixel in the input image via two 3x3 kernels, two normalization constants and one additive constant as is shown in the dialog box:



You can edit and save your own kernels or use predefined ones by reading them in from a disk file (**.KRN**).

5.9 Image Rescale

Image Processing includes three methods of Image rescaling. To access the rescale panel, select “Rescale” from the “Process” pull down menu.



5.9.1 Threshold Mode

The first button is the Threshold mode where the cursors can be moved to isolate a portion of the histogram that is to represent the entire range of the histogram.

5.9.2 Spinning Mode

The second mode that is available is the spinning mode which has a fixed point and modifies the levels around this point.

5.9.3 Multipoint Mode

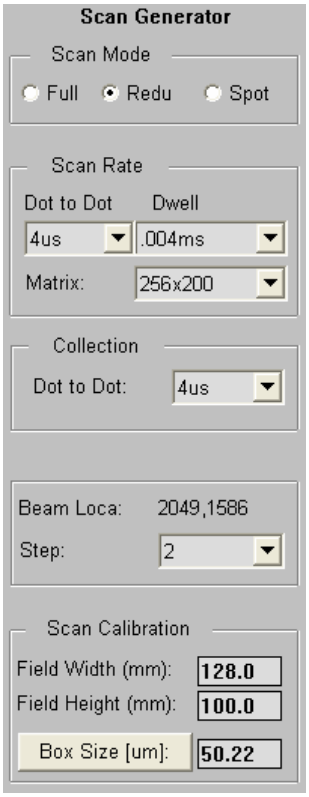
The Multipoint button mode allows the user to adjust the histogram in a nonlinear mode.

5.9.4 Scale

The “Scale” button sets the adjustments that were made to the image.

5.9.5 Undo

The undo button offers one level of undo. The image is not saved with the changes automatically so closing and reopening the image will restore the image to its original greyscale levels if the changes have not been saved.



5.10 Scan Generator Panel

The Scan Generator Panel is used for:
- adjusting the scan rate in free scanning mode (no signal collection) and in collection mode.
- selecting the beam step.
- calibrating the line measurements.

This panel should be used only by advanced users or with assistance from an EDAX service engineer.

5.10.1 Scan Mode

The scan mode radio buttons select the free scanning mode, same as the buttons in the main toolbar.

5.10.2 Scan Rate

The scan rate in free scanning mode can be adjusted via the number of pixels per frame, dwell time for pixel and dot to dot time.

5.10.3 Beam Location

The coordinates of the beam on the sample when in spot mode is given in units of 0-4095. The lower left corner of the image is (0, 0) and the upper right corner (4095, 3199).
The beam can be stepped when in spot mode, using keyboard SHIFT + directional keys. The step amount can be selected here in units of 1/4096 of the full field of view. This feature is available in Full View or in Spectrum View modes.

5.10.4 Scan Calibration

The scan calibration defines the factors used in converting the image measurements from pixels to micrometers. The scan calibration factors are used for displaying the micron bar, by line measurement tool in the imaging/ mapping and for particle measurements.
To calibrate the measurement collect an image from a sample feature that has been measured with the microscope.

(a) Calibration using line measurements:

- Use the measuring tool from the main toolbar to draw a horizontal line over the known distance.
- The measured distance will appear in the status bar at the bottom of the screen.
- Determine the ratio between the known value and the measured value of the drawn line.
- Update the Width value using the calculated ratio. The height value will update automatically. The displayed micron bar will also show the new value.
- Exit the panel. The new value will be saved and an additional image should be collected to verify the measurement.

(b) Calibration using the reduced area scan:

- Select reduced area scan mode.
- Click on Box Size button.
- Use keyboard SHIFT+ directional keys to move the square box and SHIFT + Page Up/Page Down keys to adjust the box size, so that the known feature will be inscribed tightly by the box in X direction.
- Edit the Box Size value with the known distance and click Enter.
- Use the line measuring tool to test the calibration.

6.SPECTRUM COLLECTION

Spectra can be collected and quantified in the image tab. Switch to Spectrum and Image view using the screen view button in the button bar. Collection, peak identification and standardless quantification are available with the added benefit of having the image displayed on the same screen as well.

6.1 Spectrum Collection Parameters

As with spectra collection in the Spectrum tab, correct set up is necessary for accurate quantitative and qualitative analysis. The correct time constant, based on the counts per second, should be selected to obtain a dead time between twenty and forty percent. The amp time is selected from the drop down box in the button bar.

6.1.1 Preset

A preset time for spectrum collection can also be set by selecting the desired collection length in the Preset drop down box.

6.1.2 Collection Buttons

The buttons that are used for collection include buttons in the main mapping panel for collection and peak identification as well as buttons located above the spectrum collection window for collecting and viewing the spectrum.

6.2 Peak ID

Peak Identification can be performed as in the spectrum tab. There are buttons in the main panel for auto ID as well as HPD. The panel can be expanded for manual peak identification or adjusting the auto id list.

6.2.1 Auto ID

Auto ID can be performed at any time during or after spectrum collection. Once spectrum collection has begun, it is best to wait until the spectrum has collected for a reasonable amount of time so that that statistically, the peak identification will more likely be accurate. It is appropriate to use the auto peak identification when:

1. All peaks are well defined
2. There are no difficult peak overlaps
3. The spectrum has been collected for an adequate amount of time.

To perform an auto identification of the peaks, click on the Peak ID button in the main maps/ line panel.

6.2.2 Manual ID

When manual identification is necessary, the peak identification portion of the window can be expanded so that the manual id features are available. There are two main methods of manual identification.

- In the Element edit box type either the element name or the elements number and hit enter to display the element markers. To add the element in the list click the “Add” button.
- Click on the peak of interest. Scroll through the Possible element list to find a probable match. Highlight the element to be added to the peak ID list and click “Add”.

6.2.3 HPD

The HPD (Halographic Peak deconvolution) uses the spectrum collection parameters and the element list to draw a theoretical spectrum to compare with the collected spectrum. The HPD appears as a cyan outline drawn over the spectrum on the collected spectrum. If the HPD is misfit for a particular element, that peak can be reexamined. To view the HPD click on the HPD button in the main imaging panel.

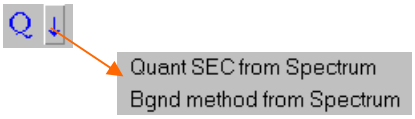
6.3 Quantification

Spectra collected in the imaging software can be quantified using the standardless quantification routine.

6.3.1 Standardless Quantification

To perform a standardless quantification press the Q button found in the button bar above the spectrum collection window.

You can select the background subtraction method and the SEC factors as set up in Spectrum Tab, from the dropped down menu of Q button.



6.3.2 Results

The results, as atomic and weight percents, will be displayed in the upper right hand portion of the analysis window where the image histogram is usually displayed. The results can be removed by clicking on the X in the top right hand corner of the results window.

6.4 Saving and Recalling Spectra

Spectra can be saved and recalled as they are in the spectrum tab.

6.4.1 Saving Spectra

To save a spectrum file click on the save button in the main panel or “Save As” in the file menu can be used. Select .spc as a file type. In the maps panel, the default file type will be .bmp. The file type must be changed before saving. Select a file location and name and then click save.

6.4.2 Saving a Spectrum and Image

A Spectrum and a corresponding image can be saved with the same file name by selecting “image and spectrum” from the file pull down menu. This will save two separate files, one .spc and one .bmp, with the same name.

6.4.3 Recalling Spectra

Spectra files can be recalled by clicking on the file open button in the button bar or by selecting “open” from the file pull down menu. Switch to .spc as the file type, browse for and select the desired file and then click open. The “File or Current Parameters” window will open. In this window, the user has the option to open the file with the element list, regions of interest, background and analysis conditions saved with the file, or, with the settings that are currently in use. A combination of both saved and current settings can be used. Select the desired parameters and then click “Ok”. Use the “all current” or “all file” for easy selection if not using a combination of both.

6.4.4 Recalling Spectrum and Corresponding Image

If the spectrum was saved along with a corresponding image the files can also be opened simultaneously by selecting “spectrum and image” as the

file type. The conformation boxes for both the image and the spectrum file will appear.

6.4.5 Importing Files from other Genesis Tabs

Spectra files can be imported from other Genesis tabs by clicking on the Import Spectrum button in the main toolbar or by selecting "Import Spc from" from the file pull down menu.

Select 'Restore' to bring back the previous spectrum.